NASA'S MISSION TO PLANET EARTH
EARTH PROBES
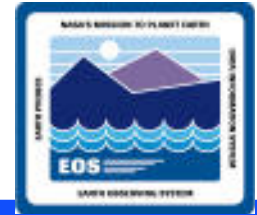DATA INFORMATION SYSTEM
EOS
EARTH OBSERVING SYSTEM

# PROBLEM MANAGEMENT

## ECS Pre-Release B Testbed Training

# Overview of Lesson

- **Introduction**
- **Writing a Trouble Ticket (TT) or Problem Report**
- **Documenting Changes**
- **Problem Resolution**
- **Preparing a TT Telecon and Processing a TT through the Failure Review Board**
- **Making Emergency Fixes**
- **Practical Exercises**
  - Writing a Trouble Ticket
  - Documenting TT Changes

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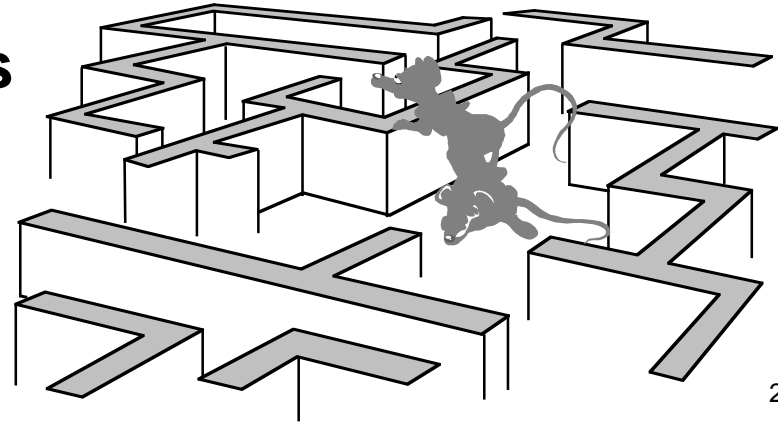
# Objectives
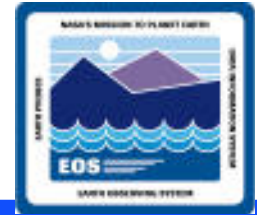
- **OVERALL:**
  - **Develop proficiency in trouble ticketing and problem resolution procedures**

- **SPECIFIC:**
  - **Submit a trouble ticket (TT)**
  - **Make changes to an existing TT**
  - **Describe the steps in the routine problem resolution process**
  - **Describe the steps in preparing a TT Telecon and processing a TT through the Failure Review Board**

# Objectives (Cont.)

- **STANDARD:  Mission Operation Procedures for the ECS Project - 611-CD-002-001**

- **Importance:  Lesson provides preparation in submitting and tracking nonconformance reports (NCRs) for all who will be operators or users of the Testbed (including support staff)**

  - **Ensures skills needed to deal with hardware, software, documentation or procedural problems that may be encountered**

  - **Helps facilitate successful rollout of Release B**

# Writing a Trouble Ticket (TT) or Problem Report

- **Electronic document for:**
  - **Reporting/recording problems**
  - **Recording an idea for a system enhancement**

- **Problems affect the following ECS components:**
  - **hardware**
  - **software**
  - **technical documents**
  - **procedures**

# Writing a TT or Problem Report (Cont.)

- **Problem Reports are submitted by...**
  - **users in the science community**
  - **ECS operators/staff**
  - **ECS developers**

- **Problem Reports for Testbed use the NonConformance Report (NCR) system**

- **Problem Report/NCR states:**
  - **open**
  - **closed**

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# Writing a TT or Problem Report (Cont.)

- **If a configuration change is required, a Configuration Change Request (CCR) is prepared.**

    – **provides documentation for the configuration management process**

    – **a problem report (Trouble Ticket or NCR) leads to a CCR only when a configuration change is proposed**

# Writing a TT or Problem Report (Cont.)
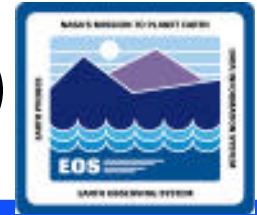
- **ECS Testbed Problem Reporting System provides a consistent means of…**
  - reporting Testbed problems
  - classifying problems
  - tracking the occurrence and resolution of problems

# Problem Report/NCR Severity Levels

- **Level 1: System cannot perform a critical function**
  - Show stopper

- **Level 2: System substantially impaired\**
  - Unacceptable (but not show stopper)

- **Level 3: System slightly impaired**

- **Level 4: Minor errors**

- **Level 5: Minor enhancements/requests**

# DDTS Main Screen Components
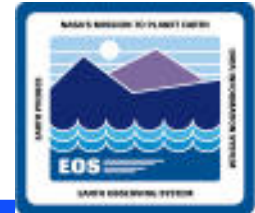
```
┌─┐                        PureDDTS 3.2.1                           ┌─┐
│ │  File   Select   Metrics   Options   Special/Support   To Do List          Help
├─┴──────────────────────────────────────────────────────────────────────────┤
│          'software' Records [SNAORTVCDF] [demo]                    2 records │
│    1 N Sv3 970409 HP OpenVie Problem Report for Training -- Sample Headline +1 ▲
│    2 N Sv3 970407 HPOV       Training Validation                           +1
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│                                                                            ▽
├──────────────────────────────────────────────────────────────────────────┤
│ │Submit│ │Commit│ │Clone│      │Refresh│ │Clear│ │Next│ │Prev│ │Print...│    │Gripe││
├──────────────────────────────────────────────────────────────────────────┤
│ The workspace currently contains 2 records                                 │
└──────────────────────────────────────────────────────────────────────────┘
┌─┐                            Record                                          
│ │  Modify   Change_State   Links   CM                                 Help
├─┴──────────────────────────────────────────────────────────────────────────┤
│Bug ID: NSIdc00006              demo                  Submitted 970409        │
│Project ID:                     HP OpenView, version unknown                  │
│ NEW defect report                 1 enclosure                               │
│                                   Page 1/2                                   │
│  "Problem Report for Training -- Sample Headline"                           │
│DETECTION INFORMATION                                                        │
│ Detection method[*]: normal use                                            │
│ Detected in phase[*]: operations                                           │
│ Test program name:                                                         │
│ Test system: mssn1hp                                                       │
│ Problem severity (1 = Showstopper)[*]: 3                                   │
│ Affects subsystem: Systems Management                                      │
│ Need fix by: 970901                                                        │
│ Related CCR #:                                                             │
│ Found in release:                                                          │
│SUBMITTER INFORMATION                                                        │
│ Submitter: Paul VanHemel                                                   │
│ Organization: National Snow and Ice                                        │
│ Phone number: 3019251110                                                   │
│                                                                            │
│ Address: pvanheme@mssn3sun                                                 │
│                                                                            │
├──────────────────────────────────────────────────────────────────────────┤
┌─┐                          Enclosures                                        
│ │                                                                           
├─┴──────────────────────────────────────────────────────────────────────────┤
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│   History   Problem                                                        │
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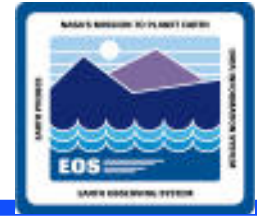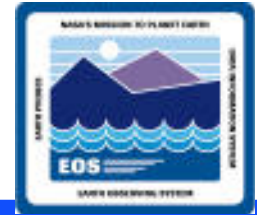
# Testbed Problem Reporting System

- **Managed by Distributed Defect Tracking System (DDTS) from PureSoft**
  - enforces progress of NCRs through the resolution process
  - captures information to document the process
  - produces management reports

- **Common means of classifying, tracking, and reporting problems**
  - provides a Graphical User Interface (GUI)
  - provides a common entry format
  - stores and retrieves problem reports/NCRs
  - defines a consistent "life cycle" for problem reports

# Writing/Submitting Problem Reports

- **Problem reports/NCRs are handled electronically**
  - common distributed-access database system
  - DDTS is the database tool

- **Supporting documentation may be handled within DDTS**
  - files may be attached to make them available to the Problem Reporting System database manager
    - » TT database manager may be the Configuration Management (CM) Administrator or the Operations Readiness and Performance Assurance Analyst, depending on the organization
  - if supplementary files are sent separately, accompanying e-mail should identify corresponding NCR number, submitter, or other relevant information
  - any non-electronic data is handled by database manager

# Documenting Changes

- **Problem reports are modified at various stages of problem resolution, for example:**
  - **assignment to a technician for problem resolution**
  - **resolution log entries**
  - **changes of status**
  - **forwarding to another site**

- **Access privileges**
  - **controlled by the database manager**
  - **determine which fields an operator/user may modify**

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# Problem Report Assign-Eval

# Establishing Defaults for NCR Review

- **Default selections for DDTS enable direct access to problem reports list you will usually want to see**

  - **Otherwise, each launch of DDTS displays warning, and you must establish your selections every time**

  - **Can select default Project, Class & State**

  - **Can select reports based on who submitted them or to whom they are assigned**

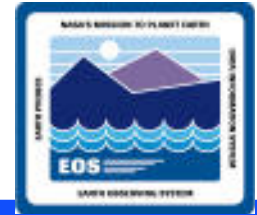# Documenting Changes (Cont.): Reviewing and Modifying Open TTs

- **Highlight/select the problem report/NCR to be reviewed/modified**

- **Use Change_State menu**
  - **N New**
  - **A Assign-Eval**
  - **O Assign-Fix**
  - **R Fix**
  - **T Assign-Verify**
  - **V Verify**
  - **C Close**
  - **D Duplicate**
  - **F Forward**

# Problem Resolution

- **Overview of Problem Resolution**
  - **Every problem report/NCR is logged into the DDTS database for record-keeping purposes**
  - **Each problem report/NCR is evaluated first at the local center**
    - » **determine the severity of the problem**
    - » **assign on-site responsibility for investigating the problem**
  - **Problem reports/NCRs that can be resolved locally are assigned and tracked at the local center**

# Problem Resolution (Cont.)

- **Overview of Problem Resolution (Cont.)**
  - **Matters of sufficient importance are escalated to the agenda of the trouble ticket teleconference ("TT Telecon")**
    - » **sponsored by the Sustaining Engineering Organization (SEO)**
    - » **held weekly**
    - » **functions as the ECS Failure/Malfunction Review Board (FRB)**
    - » **participants discuss high-priority TTs and coordinate TT activities within the Maintenance and Operations (M&O) organization as well as with development, customer, and user organizations**

# Problem Report Triage

- **Operations Coordinator reviews problem reports and assigns priorities by triage**

- **Triage system of maintenance priorities**

  - **system for assessing adverse effects on mission success on the basis of the following factors:**

    » **scope of the problem's effects (impact)**

    » **frequency of occurrence**

    » **availability of an adequate work-around**

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# Classification of Problems

- **Performance Assurance Categories**

  - **1:  system/service cannot perform critical function or imposes major safety hazard ("Red Flag")**

  - **2:  system/service substantially impaired**

  - **3:  system/service slightly impaired**

- **SEO Priorities**

  - **4:  nuisance problem**

  - **5:  closed problem**

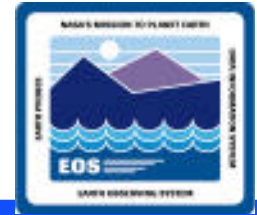# Classification of Problems (Cont.)

- **Red Flag reports (Category-1)**
    - malfunctions "involving the command and control functions of the FOS or those that can result in inability to produce, or irretrievable loss of Essential Data Products." (Performance Assurance Requirements)

# DDTS Severity Levels

- **Five levels, with first three equivalent to Performance Assurance Categories**
    - System cannot perform critical function
    - System substantially impaired
    - System slightly impaired
    - Minor errors
    - Minor enhancements/requests
- **Severity initially assigned by NCR submitter**
    - May be refined by NCR Review Board
- **Priorities are maintained by the Configuration Management (CM) Administrator**

# Severity Levels (Cont.)

- **Category-1 problems equate to Severity 1 and are escalated to the attention of the FRB**

  – require both Government and Contractor Project Manager approval for final close-out

- **Category-2 problems equate to Severity 2 rating**

  – resolved by the local NCR Review Board

  – resolution is sent to the attention of the FRB for "advice and acknowledgment"

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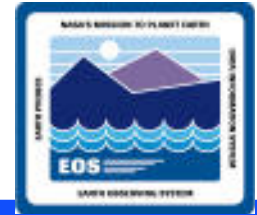# Severity Levels (Cont.)

- **Remaining types of problems are assigned TT priorities at the discretion of the Operations Coordinator**

- **Severity 2 and lower-priority trouble tickets can often be handled locally**
  - **unless they affect more than one site**

- **Problems that affect multiple sites are forwarded to the Sustaining Engineering Organization (SEO)**

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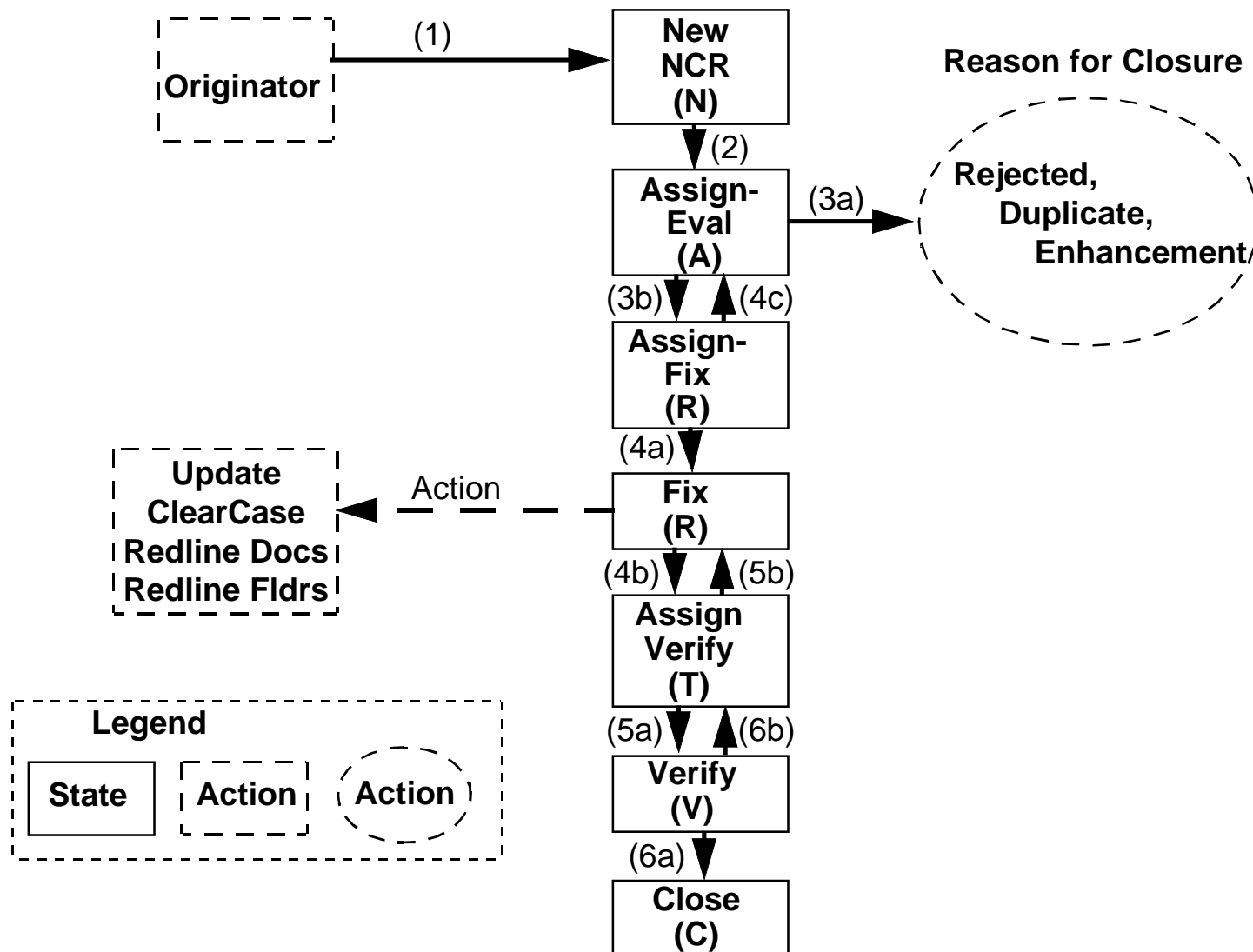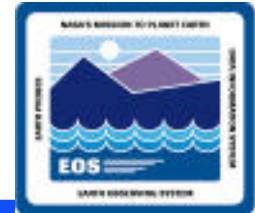
# NCR Review Board

- **Local NCR Review Board**
  - may suggest, comment, reject, approve or recommend other actions
  - generates a CCR if the problem involves a configuration change
    - » problem is entered into the Change Request Manager and directed through the configuration management process
  - issues implementing instructions if a local problem involves no configuration change
  - orders the closure of problems that have been corrected and whose fixes have been verified
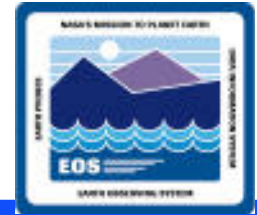
# Failure/Malfunction Review Board (FRB)

- **Meets via "TT Telecon"**

- **Reviews high-priority problem reports (Category-1)**

- **Acknowledges NCR Review Board response to Category-2 problems**

- **Coordinates problem report activities within M&O and with development, customer and user organizations**

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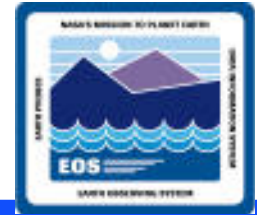
# Problem Resolution Process:
# Problem Report State Transitions



Originator

(1)

New
NCR
(N)

(2)

Assign-
Eval
(A)

(3a)

Reason for Closure

Rejected,
Duplicate,
Enhancement

(3b) (4c)

Assign-
Fix
(R)

(4a)

Update
ClearCase
Redline Docs
Redline Fldrs

Action

Fix
(R)

(4b) (5b)

Assign
Verify
(T)

(5a) (6b)

Verify
(V)

(6a)

Close
(C)

Legend

State   Action   Action

# Problem Resolution Process

- **User/operator discovers problem; submits problem report**

- **DDTS logs problem report into system, assigns state ("New") and notifies Operations Coordinator**

- **NCR Review Board assigns problem for review; state is changed to "Assign-Eval"**

- **Based on review, NCR Review Board may:**
  - **close problem report (state becomes "Closed")**
  - **assign someone to fix problem (state becomes "Assign-Fix")**

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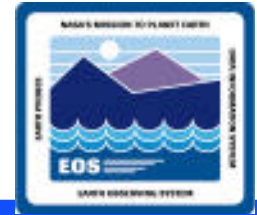# Problem Resolution Process (Cont.)

- **Upon correction of an assigned problem, state is changed to "Assign-Verify"**

  - Fix assignee may return problem to "Assign-Eval" state for further review

- **Once the verifier (the one assigned to test the fix) has verified that the problem fix is workable, problem report is changed to state of "Verify"**

  - If fix cannot be verified, state is returned to "Fix"

- **When verification results are approved by the NCR Review Board, state is changed to "Closed"**

  - If more testing is deemed necessary, state can be returned to "Assign-Verify"

# TT Telecon and FRB
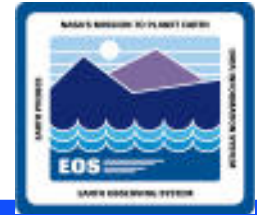
- **All Category-1 and -2 problems are submitted to the FRB TT Telecon**

    - Category 1 for review and approval

    - Category 2 for acknowledgment and advice

- **FRB uses the TT Telecon to coordinate TT activities within M&O and with development, customer and user organizations**

# TT Telecon and FRB (Cont.): TT Telecon/FRB Attendees

- **Customer representatives**

- **ECS SEO engineering team leads (one of whom is the TT Telecon/FRB chairperson)**

- **ECS ILS engineering support representatives**

- **ECS engineering team leads and operations representatives (via telecon)**

- **ECS M&O support staff**

- **ECS development organization representatives**

- **SCF(s) representatives (in person or via telecon)**
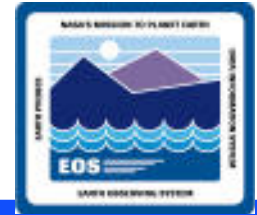
# TT Telecon and FRB (Cont.): TT Discussion

- **Review and prioritize each TT opened at each center.**
- **Review and re-prioritize older TTs (as required).**
- **Assign TT work-off responsibility to one organization.**
- **Review distribution of TTs by organization, priority and age.**
- **Discuss TT issues with development organizations.**

# TT Telecon and FRB (Cont.)

- **Agenda items may be supplemented or replaced with hardcopy or softcopy reports**

- **Material from the meeting is distributed within each ECS organization and to customer and user organizations as required**

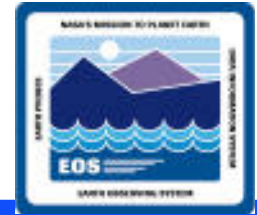456-TP-002-001

# TT Telecon and FRB (Cont.)

- **FRB obtains all necessary assistance to ensure thorough analysis of the problem**
  - **may obtain assistance from system hardware suppliers**
  - **coordinates investigations and remedial actions with the appropriate project personnel from the National Aeronautics and Space Administration (NASA)**
  - **assures proper documentation of investigations and remedial actions**
  - **ensures that configuration changes (if any) are made in accordance with the configuration management procedures**

# TT Telecon and FRB (Cont.)

- **Conditions to be verified before a malfunction report may be closed out:**

    - remedial and preventive actions completed on item

    - preventive design changes completed and verified

    - effective preventive actions established to prevent problems with other affected items

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# TT Telecon and FRB (Cont.)

- **Both FRB (first) and NASA must officially approve each Category-1 problem resolution submitted to the FRB to close it out**

- **Red Flag reports**

  - **are highlighted at Government assurance reviews**

  - **must have their resolution approved by both:**

    » **contractor project manager**

    » **Government EOS Project Manager**